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Digital divide at individual level: Evidence for Eastern and Western European countries

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ABSTRACT

The current study explores the digital divide by checking the phenomenon at the individual level. It digs into the individual pattern of adoption and use of a broad set of information and communications technologies (ICT) by introducing a conceptual model combining the extended unified theory of acceptance and use of technology (UTAUT2) and the five-factor model of personality. By doing so it provides insights on factors affecting technology adoption and the role of personality on individual usage behavior. Most of the UTAUT2 hypotheses are supported, with performance expectancy being the strongest predictor. Openness is a significant predictor of behavioral intention, whereas for usage behavior the significant personality predictors are openness, extraversion, and agreeableness. Moreover, as data were collected in Bulgaria and Portugal, a multi-group analysis revealed significant country differences. The effect of performance expectancy, habit, agreeableness, and neuroticism on behavioral intention, as well as the effect of age on usage, are stronger for Bulgaria, whereas the effect of hedonic motivation on behavioral intention and the effect of behavioral intention on usage are stronger for Portugal.

1. Introduction

Information and communication technologies (ICT) have become more integrated across all sectors of economy and society (European Commission, 2015). Research has shown that investment and evaluation of ICT is associated with economic benefits, such as higher productivity, lower costs, new economic opportunities, job creation, innovation, and increased trade (Irani, 2002; Weerakkody, Irani, Lee, Osman, & Hindi, 2015). According to the International Telecommunications Union (ITU, 2014), ICT will continue to play a major role in facilitating access to information, knowledge, and key services. As more people join the information society and high-speed communication networks, the tracking and measurement of ICT development become even more important. Continuous monitoring and measurement of ICT developments will help to identify progress and gaps.

The advancement and diffusion of technology have evolved at record-setting rates. For example, global internet penetration grew from 6.5% in 2000 to 47% in 2016 and many developed countries are experiencing penetration rates of > 90% (ITU, 2016). The ongoing development of ICT in all its forms, applications and infrastructure technology (such as broadband) is driving radical change in our lives, with the constant creation of new products and services, new ways of

conducting business, new markets and investment opportunities, new social and cultural expressions, and new channels for citizens and government to interact (Dwivedi & Irani, 2009; OECD, 2003). Hence, the continued existence of a digital divide, however defined, is an obstacle to any agenda of social inclusion. If societies are today partly, and will in the future more or less be completely structured around ICT, then the demand of economic efficiency as well as social and political equality, require that no social group finds itself excluded from participation (Alvares et al., 2014). Hence, understanding how ICT are adopted can help to reduce the digital divide.

This study seeks to contribute to the literature in this respect, through exploring the digital divide phenomenon from the perspective of individual ICT acceptance, and in which personality characteristics of the would-be adopters are also contemplated. It digs into the individual pattern of behavioral intention and usage behavior of a set of ICT, going behind the more traditional information technology (IT) adoption studies, which usually include only one technology and the potential drivers are related mainly with its direct or indirect characteristics/perceptions, toward a more comprehensive approach. Therefore, its main contributions are threefold: First, it adds to the current knowledge on digital divide by checking the phenomenon in a broader context at the individual level. Second, the study proposes a

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theoretical model for the acceptance of the ICT at the individual level that combines the extended unified theory of acceptance and use of technology (UTAUT2) (Venkatesh, Thong, & Xu, 2012) with the big five personality traits (Costa Jr. & McCrae, 1992; Digman, 1990). By doing so, it provides insights on factors affecting technology adoption and explores if and how the big five personality traits (openness, extraversion, agreeableness, conscientiousness, and neuroticism) influence usage behavior, empirically testing its applicability in the context of Eastern and Western European countries, which to the best of the authors' knowledge has not yet been done. Third, it seeks to identify what factors in the proposed model differ the most across cultures (in the context of Eastern and Western European countries). Together, these three contributions will provide an innovative and comprehensive lens for researchers and policy-makers to develop accurate policies to engender ICT acceptance, including e-government and other e-services. Studies on individual-level digital divide usually focus on socio-demographic characteristics of individuals, usually in a limited environment (e.g., a country or a region), whereas the present study also includes one's attitudes toward ICT and personality traits, as well as individuals from two different settings, i.e., countries.

Research has revealed a difference in the speed at which various countries have adopted ICT, which is known as the global digital divide. Even in countries belonging to the European Union, which is one of the international entities that pays more attention to the issue of the digital divide (European Commission, 2010a, 2010b, 2015), meaningful digital asymmetries still exist across its member states (Cruz-Jesus, Oliveira, & Bacao, 2012). In the context of this study, we have chosen two European countries that belong to the two ends of the spectrum in terms of geographical location - Bulgaria and Portugal - as there is evidence that geography plays an important role in the digital divide (Cruz-Jesus, Vicente, Bacao, & Oliveira, 2016; Maria Rosalia Vicente & Lopez, 2010a). Note that besides the geographic aspect, these two countries also joined the EU in very different contexts: Portugal was among the EU-15 (joining in 1986), while Bulgaria joined, together with Romania, in 2007. Moreover, these two countries also present different digital development stages (Cruz-Jesus, Oliveira, & Bacao, 2018; Cruz-Jesus, Oliveira, Bacao, & Irani, 2017). For example, according to the World Bank Database, the percentage of Internet users differs across the two countries in question - 56.7% in Bulgaria versus 68.6% in Portugal. Besides factors such as government policy, industry lead, and market environment, heterogeneity in the diffusion process of newly introduced goods or services has shown to be affected by collective national characteristics as well (Hwang, Jung, & Salvendy, 2006). Moreover, from a personality point of view, Bulgaria and Portugal also have considerable differences. According to Hofstede's cultural dimensions, Bulgaria and Portugal show noticeable differences in long-term orientation, indulgence, and uncertainty avoidance. In other words, Bulgarians tend to consider their own past in assessing present and future challenges, whereas Portuguese are, according to The Hofstede Centre, less prone to regulate their wishes and instincts as well as less comfortable in unknown situations.

The remainder of the paper is structured as follows. First, a theoretical background of the problem is presented, introducing the concept of digital divide, previous research on the phenomenon, overview of adoption models at the individual level, and personality traits concept. Second, a research model is proposed, and hypotheses are developed. Third, the research method is described, and study results are reported. Finally, a discussion, implications, and conclusions are presented.

2. Theoretical background

2.1. The digital divide

The digital divide is a complex phenomenon that hinges on many different factors (Hilbert, 2011). Among others, the study of the digital divide comprises different levels of ICT adoption (e.g., access and use)

as well as different adoption units (individual-, firm-, and country-level) (Dewan & Riggins, 2005).

Initially, the digital divide was defined as the gap between “those who have access to digital ICT and those who do not” (OECD, 2001). Studies conducted in the 1990s were primarily concerned with issues surrounding access, where access was measured in terms of having, or not, a computer at home that connects to the internet. Representative surveys of this period that were focused on the number and categories of people with access to a computer and Internet, are the first “Falling Through the Net” reports from the US Department of Commerce's National Telecommunications and Information Administration (NTIA) (U. S. Department of Commerce, 1995, 1998, 1999). These reports concluded that those with lower income, educational attendance, with disabilities; as well as those belonging to ethnic minorities, the elderly and women were the most likely to be digitally excluded. At country level, one of the first papers addressing the global digital divide was the one from Hargittai (1999), which concluded that although aspects related with economic, educational, language, legal, environmental, and technological infrastructure of countries could explain the digital divide. Economic wealth and telecommunications policy were the ones identified as the most important.

However, in the year 2000 the physical access among the different categories of people in the developed countries started to decline (U. S. Department of Commerce, 2000). Throughout the years researchers have reframing the overly technical concept of the digital divide, to go beyond access and pay more attention to social, psychological, and cultural backgrounds (van Dijk, 2006). Hargittai (2002) argued that there was a difference between PC and Internet access (later labeled as the first-order digital divide) to the skills to effectively use these technologies. This represented a shift in the awareness toward the digital divide problem as, until this point, it was common to believe that technology access would (almost) automatically lead to its use. Accordingly, DiMaggio and Shafer (2004) expanded the context of digital divide by referring to not just differences in access, but autonomy of use, skills, social support, and the purposes for which the technology is employed, labeled as the second-order digital divide. Indeed, as the majority of the participants in any social system have obtained access to a technology, the second-order divide starts to become more important than the first-order divide (Dewan & Riggins, 2005).

Within this context, Hsieh, Rai, and Keil (2008), for example, used a local governmental project that provided free Internet to its residents to study how different people who are socio-economically advantaged or disadvantaged made use of the Internet given that they already had access to it. In their study, they used the theory of planned behavior (TPB) with the personal network exposure, demonstrating that economically advantaged and disadvantaged people indeed have very different post-implementation behavior regarding the use of ICT. These authors concluded that economically advantaged people have a “higher tendency to respond to network exposure”, using these technologies with much more confidence than the disadvantaged. This is one of the few studies that used adoption models to assess the individual-level digital divide. Usually, research at individual-level digital divide takes place in the western world, which provides a biased view on the digital divide's determinants, as they change across countries/regions. As one example, whereas in western countries the gender-related digital divide has been strongly narrowed, in other areas of the globe that is not the case (see, e.g., Mumporeze & Prieler, 2017).

Accordingly, from a methodological standpoint, multivariate methods started to be employed as the subject start to be perceived as a multidimensional issue. Blank and Groselj (2014) used principal components analysis to find the main dimensions of ICT activities in UK users and ordinary least squares (OLS) model to identify its characteristics (age, gender, urban-rural, ethnicity, education, life stage, and marital status). At country-level, Cuervo and Menéndez (2006), for example, used factor and cluster analysis to identify the latent dimensions on the European digital divide as well as the countries' profiles on

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